REVIEWS.

THE POPULAR SCIENCE REVIEW. London (Quarterly).

The October number contains a very valuable and beautifully illustrated article on the Microscope in Geology by David Forbes, of which we make use on another page. — Dr. M. T. Masters attempts to answer the question, Why the Leaves fall? After discussing several reasons given, he thinks "on the whole, then, of all the assigned causes for the fall of the leaf, this last, dependent on an alteration, or rather on a new growth in the leaf itself, is the most important, and probably the only one of itself sufficient to produce the result." This new growth is thus described from Von Mohl's account. "Shortly before the fall of the leaf, there begins to be formed a very delicate layer of cells, the growth of which is from above downwards, so that, beginning from the axillary side of the leaf, and gradually extending downwards and outwards, nearly at right angles to the long diameter of the cells of the leaf stalk, at any rate at right angles to the plane of the leaf, it effects a gradual separation between the stem and the leaf, as effectually as a knife would do." These changes of tissues and consequent fall of the leaf are not wholly due to a change of seasons "from wet to dry, or from hot to cold, for it not unfrequently happens that if a tree be stripped of its leaves in summer, it forms during the autumn new ones, which remain on the tree during the greater part of the winter, or at any rate until long after the usual period."

Dr. E. R. Lankester gives a very useful article, well illustrated, on the Flat-worms or Planarians. The subjoined table* presents the latest views as to the classification of *Worms* taken from Peter's and Carus

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*A TABULAR VIEW OF THE CLASSES AND ORDERS OF VERMES.

Sub-kingdom: Vermes.

Class I. *Annulata* (Ringed-worms).
- Orders: *Polychæta* (Marine).
- *Oligochæta* (Land and Fresh-water).
- *Discophora* (Leeches).

Class II. *Gephyrea* (connected through the Sea-cucumbers to Echinodermata).
- Orders: *Sipunculus*, etc.

Class III. *Rotifera* (connected to Arthropods and Turbellaria).
- Orders: *Cephalotricha* (Wheel-animals).
- *Gasterotricha* (Hairy-backed animals, Chætonotus).

Class IV. *Nematelminthes* (Round-worms).
- Orders: *Nematodes* (Thread-worms, Vinegar-eels, etc.)
- *Gordiacea* (Hair-worms).
- *Acanthocephali* (Echinorhynchus).

Class V. *Platyelminthes* (Flat-worms).
- Orders: *Turbellaria* (Planarians and Nemertians).
- *Trematodes* (Flukes, King's Yellow-worms).
- *Cestodes* (Tape-worms).

Handbook of Zoölogy (Leipzig, 1863). We might say, however, that the more conservative zoölogist would substitute *class* for sub-kingdom, and *order* for class, considering the worms as a class of the "type," "branch," or "sub-kingdom" ARTICULATA. Such tabular lists of different classes of the animal kingdom we design to give from time to time in the NATURALIST. The *Rotifera*, or Wheel-animalcules, placed by Dana and other authors among the Crustacea, seem to the author to belong more properly with the Worms, connecting the latter with the Crustacea. He also notices the growing opinion among zoölogists, that the majority of the *Infusoria* may be classed among Vermes, near the Turbellaria, or Flat-worms, of which the dark, flat, leach-like worms abounding in our pools and on the seashore are examples. Their wonderful powers of reparation of injuries has been studied by Dugés, who, by slicing them with scissors, produced individuals with double heads and tails, and other modifications of form. The curious modes of reproduction are thus noticed:—

The Turbellarians propagate either by eggs deposited and fertilized in the water, several eggs being often deposited in one mass of yolk (like what was observed by Dr. Carpenter in the Dog-whelk), or by the growth of young from internal buds or pseud-ova, like the larvæ of Cecidomyia, or by transverse fission. Both Nemertians and Planarians exhibit these three methods. The young either develop directly, becoming similar to their parents at once, or they exhibit a jointed ringed structure (like Annelids), sometimes, too, carrying bristles, as has been lately shown by Mr. Alexander Agassiz, both in Planarians and Nemertians, and then, as they grow older, lose their jointed appearance and setæ; or the egg hatching results in a larva (*Pilidium*) which is totally unlike the parent, and from the body-wall of which a small worm-like animal grows and separates, leaving the bulk of the *Pilidium* to perish. This last case is very similar to that observed by Johannes Mueller in certain star-fishes. As in the Echinoderms, so in the Turbellarians, there appears to be no *rule* as to the method of development; nearly allied forms may present the most diverse conditions, the one passing through a larval stage, and the other developing directly in the most capricious manner.

Dr. Richardson writes on the Physics of the Brain, and concludes from experiments in freezing certain parts of the brain in animals, and other like experiments, by which the functions of the different parts or ganglia are determined, "that impressions are physical realities, stamped as it were on brain matter, each distinct and perfect when the matter on which it is set is in condition for motion. Everything we remember is, I doubt not, thus imprinted on the brain, on infinite points of brain-substance, each independent, free, and capable of motion when the whole mass is charged with force. The brain, in fact, is a world within of the world without that it has received in the course of its waking life."

When we see what the micro-photographer can thus do in putting physical impressions on what seem infinitesimal points of matter, and when we know that there is no assignable limit to this art, it is no crude inference that in the vast surface of the gray matter of the brain, in those cerebral lobes of which I have spoken, myriads of points of matter are thus impressed, — points of matter floating in that eighty-four per cent. of water, of which the brain is made up.

One more fact relating to the physics of the brain, as taught by experiment, and I have done. We have seen that when the anterior cerebral ganglia are destroyed for a time, an animal moves impulsively forward, and that, when the cerebellum is destroyed, the animal moves impulsively backwards. This indicates the existence of a balance of power between these centres (or ganglia); a balance which is also detectable between other centres. It is therefore a fair inference, that every centre of power in the brain is, during healthy states,

physically balanced, and that what is called a well-balanced mind is really a properly balanced brain. By this reading we explain many phenomena of living action otherwise inexplicable.

Among the reviews, a kindly word of welcome is given the NATURALIST. — MM. Bert and Blondeau have been experimenting on the contractions of the Sensitive Plant: —

M. Blondeau experimented on plants with the induced galvanic current of a Ruhmkorff's coil. He submitted three plants to the influence of the electric current. The first was operated on for five minutes; the plant when left to itself seemed prostrated, but after a while (a quarter of an hour), the leaves opened, and it seemed to recover itself. The second was acted on for ten minutes. This specimen was prostrate for an hour, after which it slowly recovered. The third specimen was galvanized for twenty-five minutes, but it never recovered, and in twenty-four hours it had the appearance of a plant struck by lightning. A fourth plant was etherized, and then exposed to the current. Strange to say the latter had not any effect, the leaves remained straight and open; thus proving, says M. Blondeau, that the mode of contraction of the leaves of the sensitive plant is in some way allied to the muscular contraction of animals.

NATURAL HISTORY MISCELLANY.

BOTANY.

MONSTROUS FLOWERS OF HABENARIA FIMBRIATA. — Mr. W. W. Denslow, of New York, found last summer a spike of this orchid with all the flowers abnormal, spurless, and fringeless. A few of the flowers, examined by me, exhibit the following peculiarities. All of them are dimerous, even to the ovary. The most reduced has the perianth simply of two sepals, anterior and posterior, and the anther and stigma nearly normal: no vestige of petals. The others have a perianth of four pieces, resembling the normal sepals, no labellum, and generally two anthers, alternating with the inner pieces of the perianth. One of these anthers is occasionally somewhat petaloid, but with one or both the cells well formed, although more separated on the petaloid connective; the pollen and the gland nearly normal. In one flower the two opposed anthers are exactly similar, and nearly normal, but with the slender tip of the cells more curved, so that the glands which are contiguous in pairs, are upturned. The stigma is central and symmetrical. In more than one flower there is an attempt at a second pair of anthers, within and alternate with the others; one of these is occasionally well formed, and the other rudimentary. — A. GRAY.

THE ELDER (SAMBUCUS CANADENSIS) AS A NATIVE PLANT. — The responses to our inquiry are generally in favor of the affirmative. The most explicit testimony received, however, is the following, from our excellent correspondent, Mr. M. S. Bebb. He writes. "I never saw *Sambucus Canadensis* out of a fence corner; but my father who was born in Southern Ohio in 1802, and who remembers distinctly the first White and Red Clover, Blue Grass, and Black Mustard he ever saw, — he lived in the back woods nine miles from any settlement, when Cincinnati and Marietta